Management Software

AT-S82

User's Guide

For the AT-GS950/8 Layer 2 Gigabit Ethernet WebSmart Switch

Version 1.0.0

613-000375 Rev. A

Allied Telesis

Contents

Figures

Preface

This guide contains instructions on how to use the AT-S82 management software to manage the AT-GS950/8 Smart Switch switch.

This preface contains the following sections:

Where to Find Web-based Guides

The installation and user guides for all Allied Telesis products are available in portable document format (PDF) on our web site at **www.alliedtelesis.com**. You can view the documents online or download them onto a local workstation or server.

Contacting Allied Telesis

This section provides Allied Telesis contact information for technical support as well as sales and corporate information.

Online Support

You can request technical support online by accessing the Allied Telesis Knowledge Base: **http://kb.alliedtelesis.com**. You can use the Knowledge Base to submit questions to our technical support staff and review answers to previously asked questions.

Email and Telephone Support

For Technical Support via email or telephone, refer to the Support & Services section of the Allied Telesis web site: **www.alliedtelesis.com**.

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Products for return or repair must first be assigned a return materials authorization (RMA) number. A product sent to Allied Telesis without an RMA number will be returned to the sender at the sender's expense.

To obtain an RMA number, contact Allied Telesis Technical Support through our web site: **www.alliedtelesis.com**.

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Management Software Updates

New releases of management software for our managed products are available from either of the following Internet sites:

- Allied Telesis web site: **www.alliedtelesis.com**
- Allied Telesis FTP server: **ftp://ftp.alliedtelesis.com**

To download new software from the Allied Telesis FTP server from your workstation's command prompt, you must have FTP client software. Additionally, you must log in to the server. The user name is "anonymous" and your email address is the password.

Chapter 1

Getting Started

This chapter provides information and instructions on how to access the AT-S82 management software by starting a web browser management session. This chapter contains the following sections:

Starting a Management Session

You establish a local management session with the AT-GS950/8 switch by connecting an Ethernet cable to one of the eight ports on the front panel of the switch.

To start a management session, perform the following procedure:

1. Start a web browser.
2. In the URL field of the web browser, enter the default IP address of the switch: 192.168.1.1

   The AT-S82 management software displays the login dialog box shown in Figure 1.

Figure 1. Login Dialog Box

3. Enter the administrator's default name, manager.
4. Enter the administrator's default password, friend.

Note
To change the administrator's password, refer to "Changing the Administrator's Password" on page 22.

The main page, which by default displays the Basic Switch Information page, is shown in Figure 2.

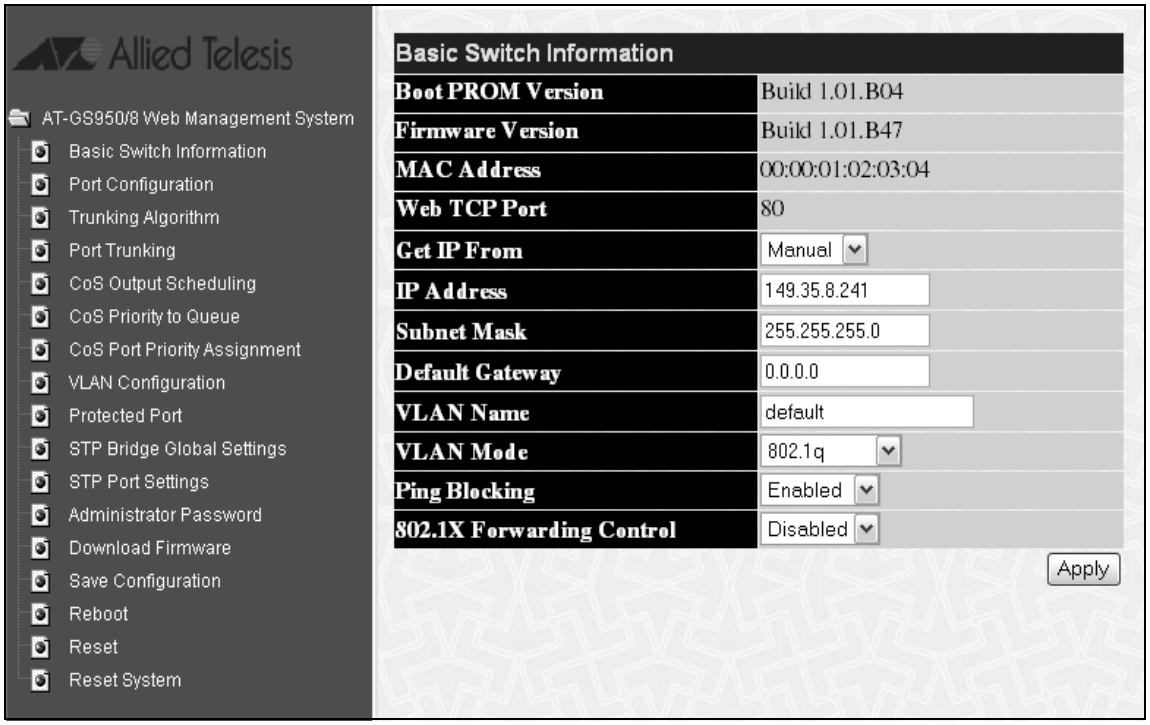


Figure 2. Main Page

Saving Changes

The management software *applies* the changes you make when you click the Apply button on any web page. However, the management software does not automatically *save* the changes you make to the configuration file. You can save your changes to the configuration file each time that you change a parameter, or save the changes after you are done with all your changes and before you exit the web browser.

Note
If you do not save changes using the Save Configuration page, your changes are lost when the switch is rebooted.

To save your configuration changes, perform the following procedure:

1. From the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3.
   .

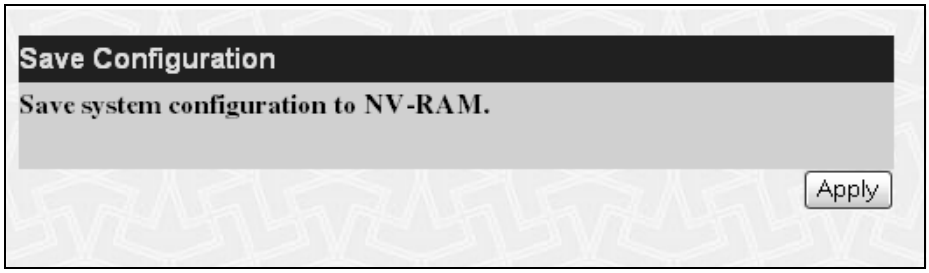


Figure 3. Save Configuration Page

2. Click **Apply**.

Quitting a Management Session

To quit a management session, close the web browser.

Chapter 2

Basic Switch Parameters

This chapter contains the following sections:

Configuring the IP Address, Subnet Mask, Gateway Address, and BOOTP or DHCP

This procedure explains how to assign an IP address, subnet mask, and gateway address to the switch.

To set the switch's IP configuration, perform the following procedure:

1. From the main menu, select **Basic Switch Information**.

   The Basic Switch Information page is shown in Figure 4.

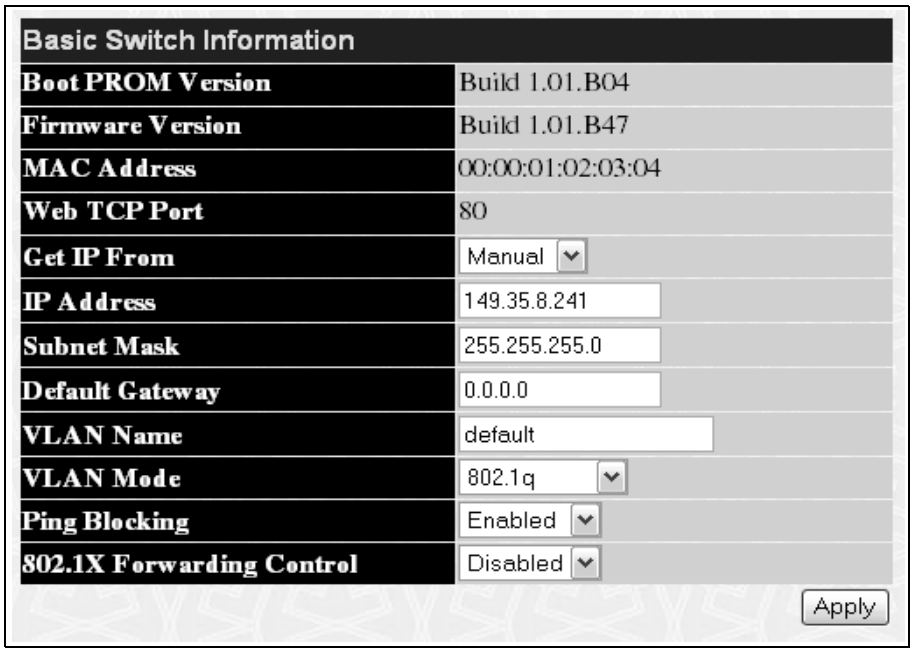


Figure 4. Basic Switch Information Page

2. To set the switch's IP address, in the **Get IP Address** field, choose one of the following from the list:

   Manual - Allows you to enter static IP address information:

   a. In the **IP Address** field, enter the IP address. The default is 192.168.1.1.

   b. In the **Subnet Mask** field, type the subnet mask for the switch. The default is 255.255.255.0.

   c. In the **Default Gateway** field, type the IP address of the default gateway. There is no default gateway assigned.

BOOTP - Enables BOOTP so that the switch gets its IP address from a BOOTP server. When you choose this selection, the IP Address, Subnet Mask, and Default Gateway fields are not available.

DHCP - Enables DHCP so that the switch gets its IP address from a DHCP server. When you choose this selection, the IP Address, Subnet Mask, and Default Gateway fields are not available.

3. Click **Apply** to implement your changes.
4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Disabling or Enabling Ping Blocking

You can allow the switch to respond to ping requests by setting the Ping Blocking parameter. The default setting is enabled, which means that the switch does not respond to ping requests.

To disable or enable ping blocking, perform the following procedure:

1. From the main menu, select **Basic Switch Information**.

   The Basic Switch Information page is shown in Figure 4 on page 18.

2. For **Ping Blocking**, choose one of the following:

   Enabled
   The switch does not respond to ping requests. This is the default.

   Disabled
   The switch responds to ping requests. Allied Telesis recommends that you choose this setting.

3. Click **Apply** to implement your changes.

4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Enabling or Disabling 802.1X Forwarding Control

This procedure describes how to enable or disable 802.1x forwarding control. The default setting is disabled. When you disable this feature, 802.1x packets are not forwarded. If this feature is enabled, these packets are forwarded to their destination which might be a switch running an authentication protocol.

To disable or enable 802.1X forwarding control, perform the following procedure:

1. From the main menu, select **Basic Switch Information**.

   The Basic Switch Information page is shown in Figure 4 on page 18.

2. For **802.1X Forwarding Control**, choose one of the following:

   Enabled
   The switch does not respond to ping requests. This is the default.

   Disabled
   The switch responds to ping requests.

3. Click **Apply** to implement your changes.

4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Changing the Administrator's Password

To reset the administrator's password, perform the following procedure:

1. From the main menu, select **Administrator Password**.

   The Administrator Password page is shown in Figure 5.

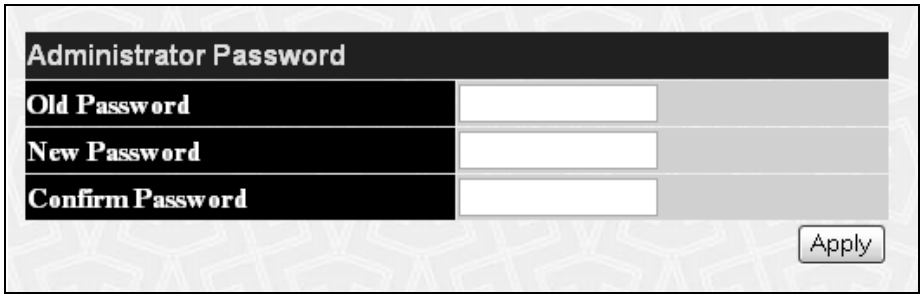


Figure 5. Administrator Password Page

2. In the **Old Password** field, type the old password.
3. In the **New Password** field, type the new password.
4. In the **Confirm Password** field, retype the new password.
5. Click **Apply** to implement your changes.
6. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

7. Click **Apply**.

Rebooting the Switch

This procedure reboots the switch and reloads the AT-S82 management software from flash memory. You might reboot the device if you believe it is experiencing a problem. Rebooting the device does not change any of the device's parameter settings.

Caution
The switch does not forward network traffic during the reboot process. Some network traffic may be lost.

To reboot the switch, perform the following procedure:

1. From the main menu, select **Reboot**.

   The Reboot page is shown in Figure 6.

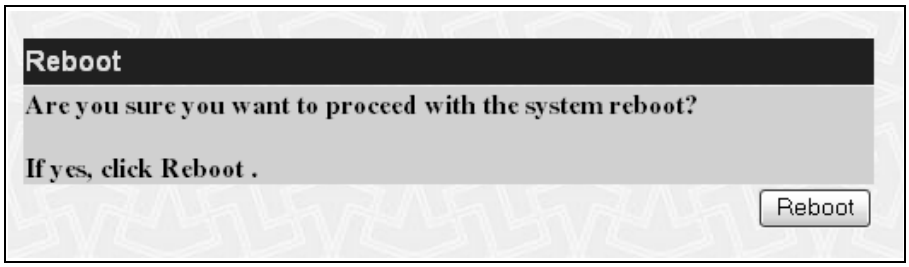


Figure 6. Reboot Page

2. Click **Reboot**.

   The switch immediately begins to reload the AT-S82 management software. This process takes approximately one minute to complete. You can not manage the device during the reboot. After the reboot is finished, you can log in again if you want to continue to manage the switch.

Resetting the Switch and Retaining the IP Address

There are two options for resetting the switch: resetting all the parameters except the IP address, or resetting the switch to return all the parameters to their default values. The procedure for resetting the switch to the default values is described in “Returning the AT-S82 Management Software to the Factory Default Values” on page 25.

To reset the switch and retain the IP address, perform the following procedure:

1. From the main menu, select **Reset**.

   The Reset page is shown in Figure 6.

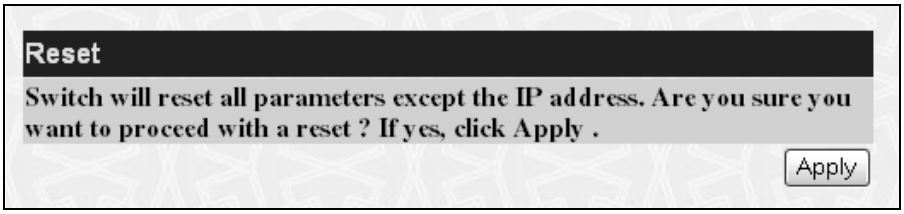


Figure 7. Reset Page

2. Click **Apply**.

   The switch is reset.

Returning the AT-S82 Management Software to the Factory Default Values

This procedure returns all AT-S82 management software parameters to their default values, including the IP address, which is reset to 192.168.1.1. To reset all the parameters except the IP address, follow the procedure in "Resetting the Switch and Retaining the IP Address" on page 24.

Caution
This procedure causes the switch to reboot. The switch does not forward network traffic during the reboot process. Some network traffic may be lost.

To return the AT-S82 management software to the default settings, perform the following procedure:

1. From the main menu, select **Reset System**.

   The Reset System page is shown in Figure 8.

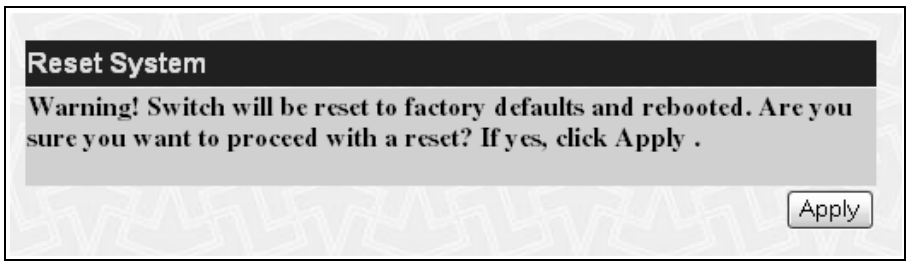


Figure 8. Reset System Page

2. Click **Apply**.

   The switch returns its operating parameters to the default values and begins to reload the AT-S82 management software. This process takes approximately one minute to complete. You cannot manage the switch during the reboot. After the reboot is finished, you must start a new web browser management session if you want to continue to manage the switch.

Downloading New Firmware

To download new firmware onto the switch, perform the following procedure:

1. From the main menu, select **Download Firmware**.

   The Download Firmware page is shown in Figure 9.

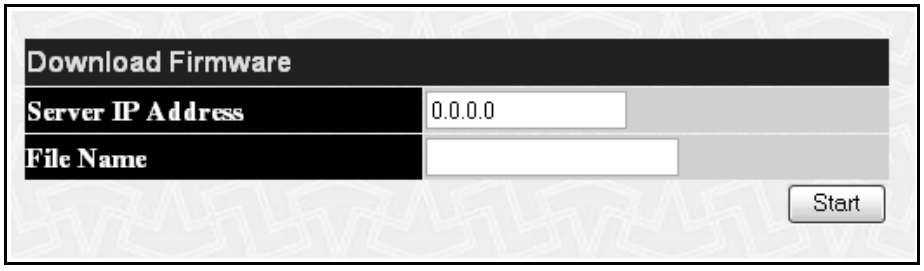


Figure 9. Download Firmware Page

2. In the **Server IP Address** field, type the IP address of the server where the firmware file is located.
3. In the **File Name** field, type the path for the firmware file.
4. Click **Start**.

   A series of download status messages, such as the one shown in Figure 10, report the status of the download process until it is complete and the flash memory has been updated.

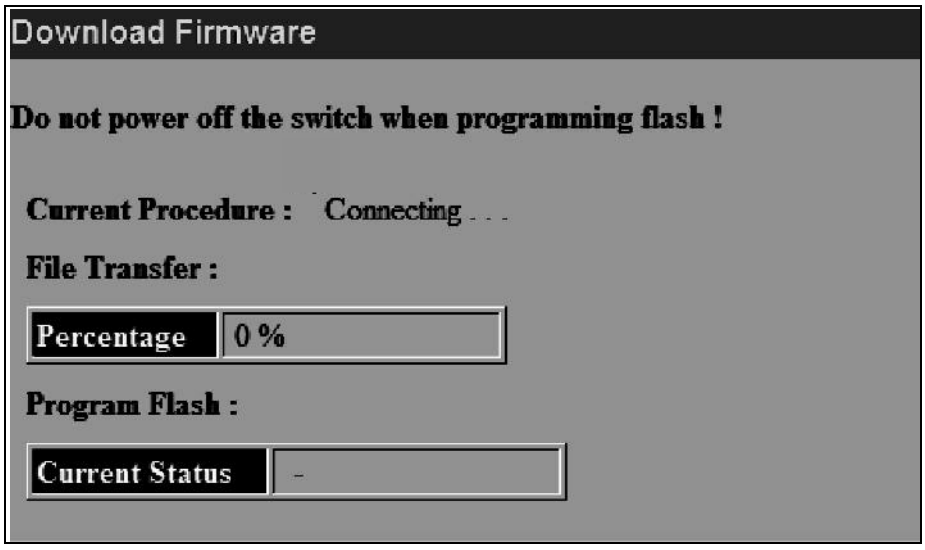


Figure 10. Download Status Message

Chapter 3

Port Configuration

This chapter contains the following section:

Configuring Port Parameters

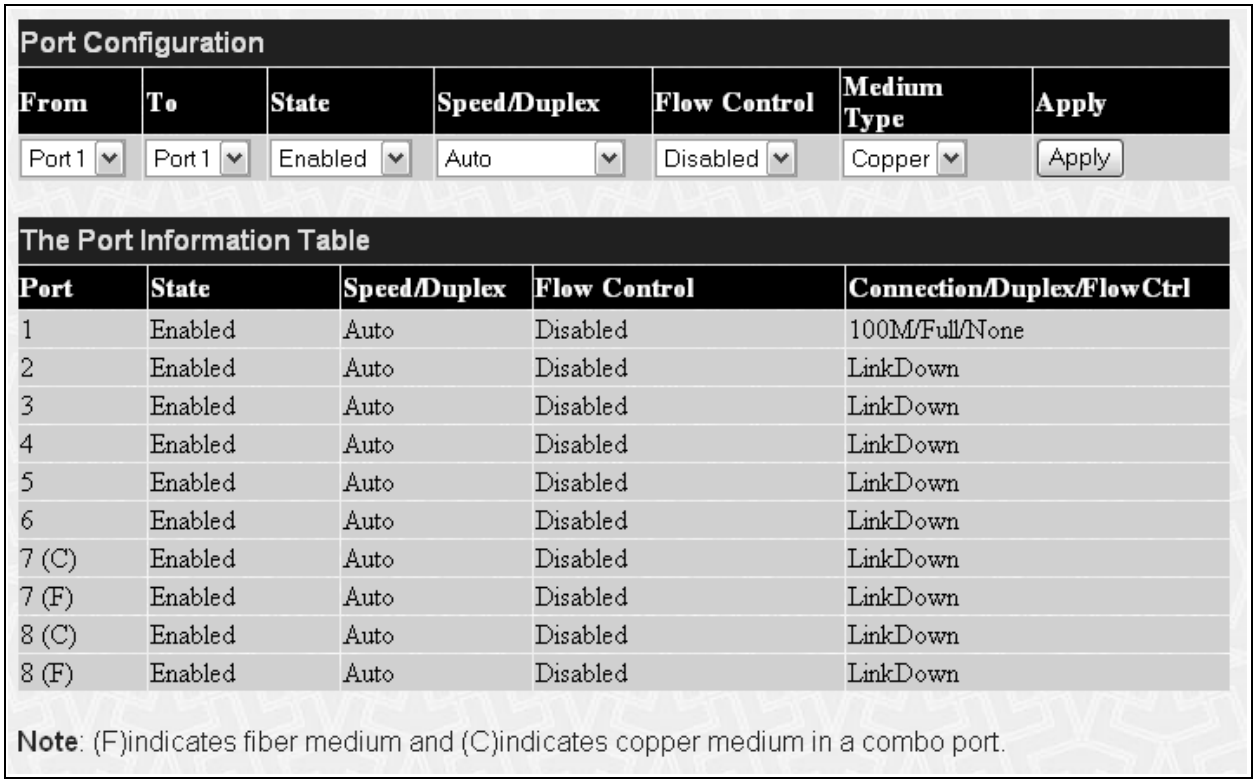
This procedure explains how to configure the following port parameters:

- State
- Speed and duplex mode
- Flow control
- Medium type (only for ports 7 and 8)

To configure the ports, perform the following procedure:

1. From the main menu, select **Port Configuration**.

   The Port Configuration page is shown in Figure 11.



Port Configuration

From	To	State	Speed/Duplex	Flow Control	Medium Type	Apply
Port 1	Port 1	Enabled	Auto	Disabled	Copper	Apply

The Port Information Table

Port	State	Speed/Duplex	Flow Control	Connection/Duplex/FlowCtrl
1	Enabled	Auto	Disabled	100M/Full/None
2	Enabled	Auto	Disabled	LinkDown
3	Enabled	Auto	Disabled	LinkDown
4	Enabled	Auto	Disabled	LinkDown
5	Enabled	Auto	Disabled	LinkDown
6	Enabled	Auto	Disabled	LinkDown
7 (C)	Enabled	Auto	Disabled	LinkDown
7 (F)	Enabled	Auto	Disabled	LinkDown
8 (C)	Enabled	Auto	Disabled	LinkDown
8 (F)	Enabled	Auto	Disabled	LinkDown

Note: (F)indicates fiber medium and (C)indicates copper medium in a combo port.

Figure 11. Port Configuration Page

The top part of the page allows you to select port(s) and apply configuration parameters. The bottom part shows the current configuration.

Ports 7 and 8 are listed twice, once as a twisted pair port (copper) as ports 7R and 8R, and once as an SFP (fiber) port as ports 7 and 8. This allows you to see if the port is operating as a twisted pair or SFP port, or if the ports are operating in combo fashion.

Note
Auto Speed/Duplex is disabled when you manually configure a port's Speed/Duplex. In this situation, you must use a crossover Ethernet cable to connect that port to another network device.

2. To set the parameters for a port, choose the port using the **From** and **To** lists. You can select one port (From 2 To 2, for example) or a range of ports (From 1 To 5, for example).

3. From the **State** list, choose one of the following:

   Enabled
   The port is enabled. This is the default.

   Disabled
   The port is disabled.

4. From the **Speed/Duplex** list, select one of the following:

   - Auto - When you select this option, the switch automatically sets the speed and duplex mode of the port. The switch determines the highest possible common speed between the port and its end node, and sets the port to that setting. This helps ensure that the port and its end node are operating at the highest possible speed.

     In order for a switch port to successfully autonegotiate its duplex mode with an end node, the end node should also be using autonegotiation. Otherwise, a duplex mode mismatch can occur. A switch port using autonegotiation defaults to half-duplex if it detects that the end node is not using autonegotiation. This results in a mismatch if the end node is operating at a fixed duplex mode of full-duplex.

     To avoid this problem on the copper ports, when you connect an end node with a fixed duplex mode of full-duplex to a switch port, you should disable autonegotiation on the port and set the port's speed and duplex mode manually.

     If you think that a port and end node are not operating in the same duplex mode at a speed of 1000Mbps, you can configure the ports for Forced mode. To do this, you configure the switch port to be the master port (capable of sending detect and negotiate signals), and the end node as a slave port (capable of receiving negotiate signals).

Note
You cannot modify the speed or duplex mode of the SFP ports.

- ❒ 10M/Half - 10Mbps, half duplex
- ❒ 10M/Full - 10Mbps, full duplex
- ❒ 100M/Half - 100Mbps, half duplex
- ❒ 100M/Full - 100Mbps, full duplex
- ❒ 1000M/Full - 1000Mbps, full duplex
- ❒ 1000M_M/Full - 1000Mbps, full duplex for port operating as a Master port at 1000Mbps in Force mode. This allows the port to send detect and negotiate signals.
- ❒ 1000M_S/Full - 1000Mbps, full duplex for port operating as a Slave port at 1000Mbps in Force mode. This allows the port to receive negotiate signals.

5. To enable or disable flow control on the port, choose the port using the **From** and **To** lists. You can select one port (From 2 To 2, for example) or a range of ports (From 1 To 5, for example).

6. From the **Flow Control** list, choose one of the following:

   Enabled
   Flow control is enabled.

   Disabled
   Flow control is disabled. This is the default.

7. From the **Medium Type** list, choose one of the following:

   Note
   This setting applies only to the SFP ports, ports 7 and 8, shown as ports 7F and 8F in the Port Configuration page.

   Copper
   Copper SFP.

   Fiber
   Fiber SFP.

8. Click **Apply** to implement your changes.

9. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

10. Click **Apply**.

Chapter 4
Trunking

This chapter contains the following sections:

Trunking Overview

A port trunk is an economical way for you to increase the bandwidth between the Ethernet switch and another networking device, such as a network server, router, workstation, or another Ethernet switch. A port trunk is a group of ports that have been grouped together to function as one logical path. A port trunk, therefore, increases the bandwidth between the switch and the other network device and is useful in situations where a single physical link between the devices is insufficient to handle the traffic load. The AT-S82 management software provides for four trunks with a maximum of two ports each.

Because network vendors employ different techniques to implement trunking, a trunk on one device might not be compatible with the same feature on a device from another manufacturer. Therefore, trunks are typically made only between devices from the same vendor.

If a port in a static trunk loses its link, the trunk's total bandwidth is reduced until the lost link is reconfigured.

Trunking Guidelines

The following are guidelines for setting up trunking:

- To ensure compatibility, set up trunks only between AT-GS950/8 devices.
- The trunk always contains two ports, one of which is designated the master port.
- The AT-S82 management software is preconfigured for you to select trunks 1, 2, 3, or 4, with ports preassigned to each trunk. Trunk 1 has ports 1 and 2, trunk 2 has ports 3 and 4, and so forth. You cannot alter either setting.
- Before you create a trunk, examine the speed, duplex mode, and flow control settings of all the ports that will be in the trunk. Verify that the port settings are identical.
- After you create a trunk, do not change the speed, duplex mode, or flow control setting of any port in the trunk without making the same changes to the other ports.
- The ports of the trunk must be members of the same VLAN.
- The switch selects the lowest numbered port in the trunk to handle broadcast packets and packets of unknown destination. For example, in trunk 2 containing ports 3 and 4, port 3 is used for broadcast packets.

Trunking Algorithm

One of the steps in creating a trunk is the selection of a load distribution method, also known as the *trunking* (or load distribution) *algorithm*. This algorithm determines how the switch distributes the traffic load across the ports of the trunk. The AT-S82 management software provides three load

distribution methods:

- MAC-SA - source MAC address
- MAC-DA - destination MAC address
- DAxorSA - destination MAC address/source MAC address

Configuring the Trunking Algorithm

To configure the trunk load method, perform the following procedure:

1. From the main menu, select **Trunking Algorithm**.

   The Trunking Algorithm page is shown in Figure 12.

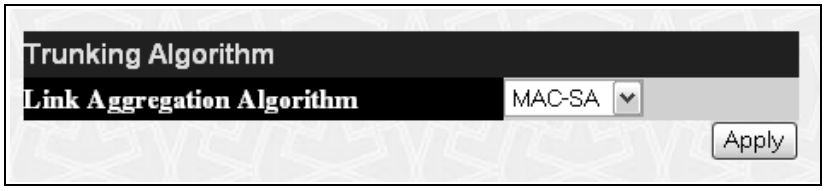


Figure 12. Trunking Algorithm Page

2. Choose one of the load methods from the list:

   MAC-SA
   By the source MAC address.

   MAC-DA
   By the destination MAC address.

   DAxorSA
   Using either the destination MAC address or source MAC address.

3. Click **Apply** to implement your changes.

4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Setting up the Trunk

To set up the trunk, perform the following procedure:

1. From the main menu, select **Port Trunking**.

   The Port Trunking page is shown in Figure 13.

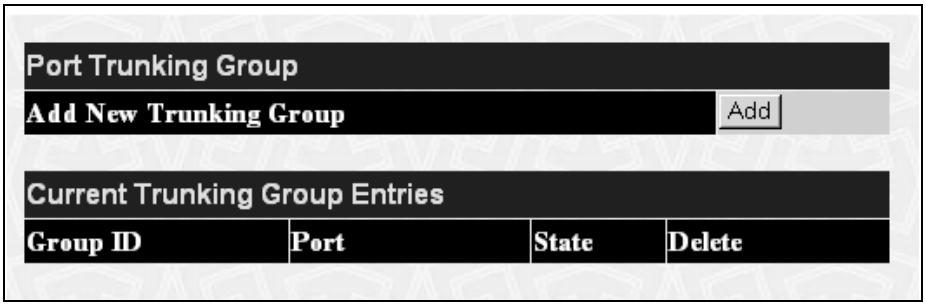


Figure 13. Port Trunking Page

   The current trunks, if any, are shown in the Current Trunking Group Entries area.

2. Click **Add**.

   The Port Trunking Configuration page is shown in Figure 14.

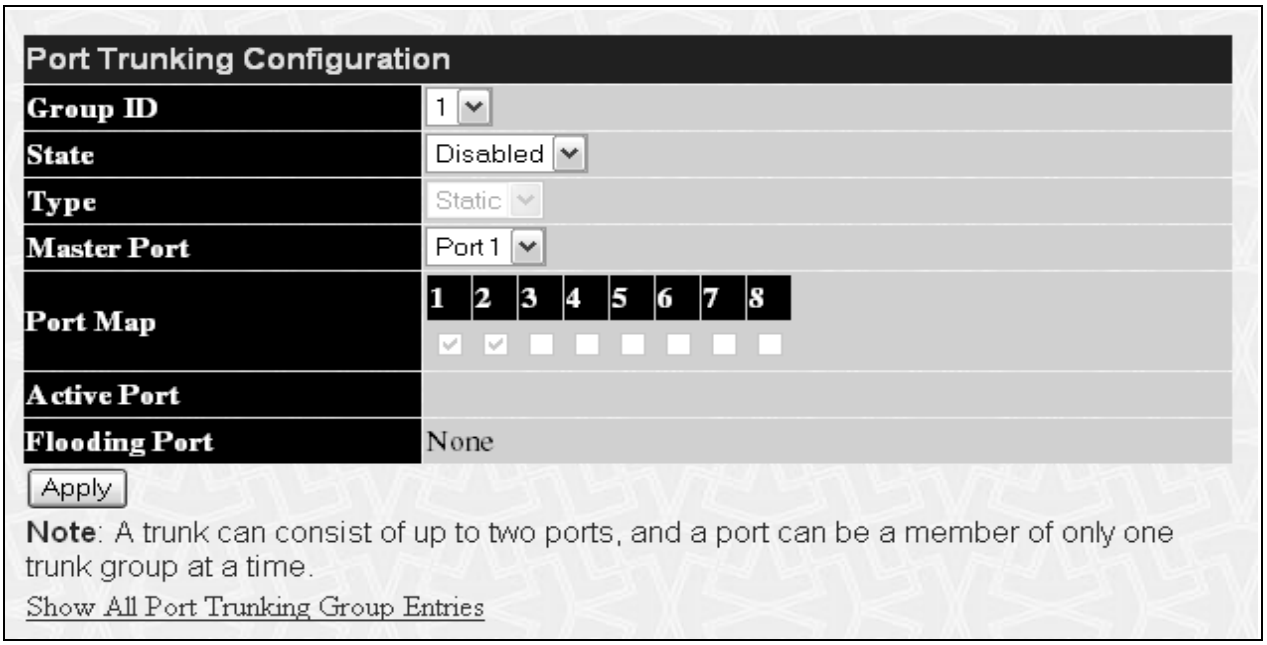


Figure 14. Port Trunking Configuration Page

3. For the **Group ID**, choose a trunk group ID from the list. IDs from 1 through 4 are available. Note that when you choose a group ID that ports are automatically selected on the Port Map. You cannot designate any other ports for the trunk

4. For the **State**, choose the state of the trunk, either enabled or disabled.

   Note
   Ignore the **Master Port** field. The Active Port field displays which ports in the trunk have established an active link. The Flooding port field displays the lowest active port in the trunk pair.

5. Click **Apply** to implement your changes.

6. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

7. Click **Apply**.

Chapter 5
VLANs

This chapter contains the following sections:

VLAN Features

A Virtual Local Area Network (VLAN) is a logical grouping of devices on different physical LAN segments that allows users to communicate as if they were physically connected to a single LAN, independent of the physical configuration of the network.

With VLANs, you can segment your network and group end-nodes with related functions into their own separate, logical LAN segments. For example, the marketing personnel in your company may be spread throughout a building. Assigning marketing to a single VLAN allows marketing personnel to share resources and bandwidth as if they were connected to the same segment. The resources of other departments can be visible to the marketing VLAN members, accessible, or accessible only to specified individuals.

A few benefits of a VLAN architecture are described in the following sections.

Increased Performance

In traditional Layer 2 switched networks, broadcast packets are sent to each and every individual port. Grouping users into logical networks limits broadcast traffic to users performing similar functions or users within individual workgroups. High traffic, the danger of broadcast storms, router latency, and data collisions are significantly reduced, and the efficiency of the entire network is improved.

Improved Manageability

VLANs provide a fundamental improvement in the design, administration, and management of LANs. Before VLANs, physical changes to a network were made at the switch in the wiring closet.

For example, if an employee transferred to a new department, changing that employee's LAN segment assignment often required a physical wiring change at the switch.

As a software-base solution, VLANs eliminate the restriction of existing network design and cabling infrastructure and allow the centralized configuration of switches located in many different locations. VLAN memberships are changed quickly and efficiently from the management console rather than in a wiring closet.

Increased Security

VLANs provide additional security not available in a shared media network environment. Because a switched network only delivers frames to intended recipients, and only broadcast frames to other members of the VLAN, a network administrator can segment users requiring access to sensitive information into separate VLANs from the rest of the general user community.

VLANs can be used to control the flow of data in your network, since the traffic generated by an end-node in a VLAN is restricted to the other end-nodes in the same VLAN. In addition, VLANs can prevent data from flowing to unauthorized end-nodes

VLAN Overview

This VLAN overview contains the following sections:

VLAN Name

To create a port-based VLAN, you must give it a name. The name should reflect the function of the network devices that are be members of the VLAN. Examples include Sales, Production, and Engineering.

VLAN Identifier

Every VLAN in a network must have a unique number assigned to it. This number is called the VLAN identifier (VID). This number uniquely identifies a VLAN in the switch and the network. The factory default VID is 1 for all ports.

If a VLAN consists only of ports located on one physical switch in your network, you assign it a VID different from all other VLANs in your network.

If a VLAN spans multiple switches, then the VID for the VLAN on the different switches should be the same. The switches are then able to recognize and forward frames belonging to the same VLAN even though the VLAN spans multiple switches.

For example, if you had a VLAN titled Marketing that spanned three AT-GS950/8 switches, you would assign the Marketing VLAN on each switch the same VID.

VLAN Port Members

You need to specify which ports on the switch are to be members of a VLAN. A port can be specified as a member of one or more VLANs up to 255, the maximum number of VLANs supported by the switch. The factory default VID is 1. Therefore, each port is initially configured to be a member of VLAN 1, which is known as the default VLAN.

Note
The switch is preconfigured with the Default VLAN only. All ports on the switch are initially members of the Default VLAN.

If a port is assigned to be a new member of a VLAN, its membership can be defined as either tagged or untagged.

Tagged Port Members

A port is a tagged member of a specific VLAN when it is a member of more than one VLAN. If a port is a tagged member of one VLAN, then the same port is also an untagged member of another VLAN.

Untagged Port Members

A port is an untagged member of a VLAN if the PVID is equal to the VID of that VLAN. A port can be an untagged member of only one VLAN. An example of this is the Default VLAN configuration where all ports are initially configured to be untagged members of VLAN 1 only. A port can also be an untagged member of one VLAN and be a tagged member of one or more VLANS.

Incoming and Outgoing Tagged and Untagged Frames

The VLAN information within an Ethernet frame is referred to as a tag or tagged header. The frame containing this VLAN tag information is referred to as a tagged frame. Likewise, a frame that does not contain this VLAN tag information is referred to as an untagged or standard frame. A tag, which follows the source and destination addresses in the frame's header, contains the VID information of the VLAN to which the frame belongs, according to the IEEE802.3ac VLAN tagging standard.

When a switch receives a frame, it examines the frame header to see if it contains a VLAN tag (tagged frame) or no tag (untagged frame). After switching the frame to an outgoing port and before transmitting it, the switch determines if the tag information should be kept in the header or should be stripped out and made into an untagged frame.

Incoming Frames

Tagged frames received by the switch are only accepted (not dropped) if the tag information contained in the frame is equal to one of the VIDs of which the port is a member. If the tag information contained in the frame does not match one of these VIDs, the frames are dropped or discarded.

Untagged frames received by the switch are always accepted by all ports on the switch. Each untagged frame is assigned to the VLAN number of which the port is an untagged member. The switch then forwards this frame to one of the other member ports of that VLAN.

Outgoing Frames

Frames being transmitted from the switch retain their VLAN tag information in the frame header if the frame's tag does not match the PVID of the port (a tagged member of that VLAN). These frames are untagged after transmission from the switch.

The VLAN tag information in the header of the frame is stripped from the frame's header if the tag matches the PVID of the port (an untagged

member of the VLAN). These frames are untagged after transmission from the switch.

Guidelines for Creating a VLAN

The following are guidelines for creating a VLAN.

- Each VLAN must be assigned a unique VID. If a particular VLAN spans multiples switches, each part of the VLAN on the different switches should be assigned the same VID.
- A port can be an untagged member of only one VLAN at a time and can receive both tagged and untagged packets.
- If you want a port to be an untagged member of a different VLAN, you must first modify the VLAN (usually the default VLAN) where the port is an untagged member. First, delete that port from the original VLAN and then assign the port to another VLAN as an untagged port.
- A VLAN that spans multiple switches requires a port on each switch where the VLAN is located to function as an interconnection between the switches where the various parts of the VLAN reside.

  This port may be defined as an untagged member of a VLAN where the port is connected to another switch via another untagged port member of the VLAN. This means that all traffic on this inter-switch port contains traffic for that VLAN only.

  Another scenario is where the port could be an untagged member of one VLAN and a tagged member of one or more VLANs. The port would then be connected to another switch via a port with the same VLAN membership. This means that the traffic on this inter-switch port is for any or all of the VLANs of which the port is a member.

- If there are end nodes in different VLANs that need to communicate with each other, a router or Layer 3 switch is required to interconnect the VLANs.

The switch can support up to a total of 255 VLANs.

Working with VLANs

This section contains the following procedures for working with VLANs:

- "Creating a VLAN," next
- "Displaying all VLANs" on page 44
- "Modifying a VLAN" on page 45

Creating a VLAN

To create a VLAN, perform the following procedure:

1. From the main menu, select **Static VLANs**.

   The 802.1Q Static VLAN page is shown in Figure 15.

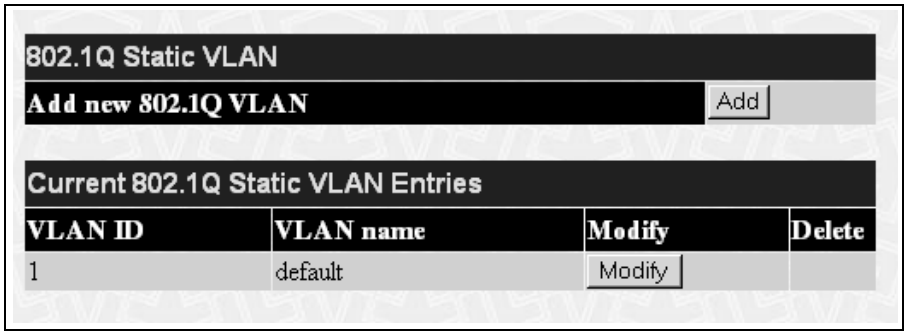


Figure 15. 802.1Q Static VLAN Page

2. Click **Add**.

   A new page opens where you specify the VLAN, as shown in Figure 16.

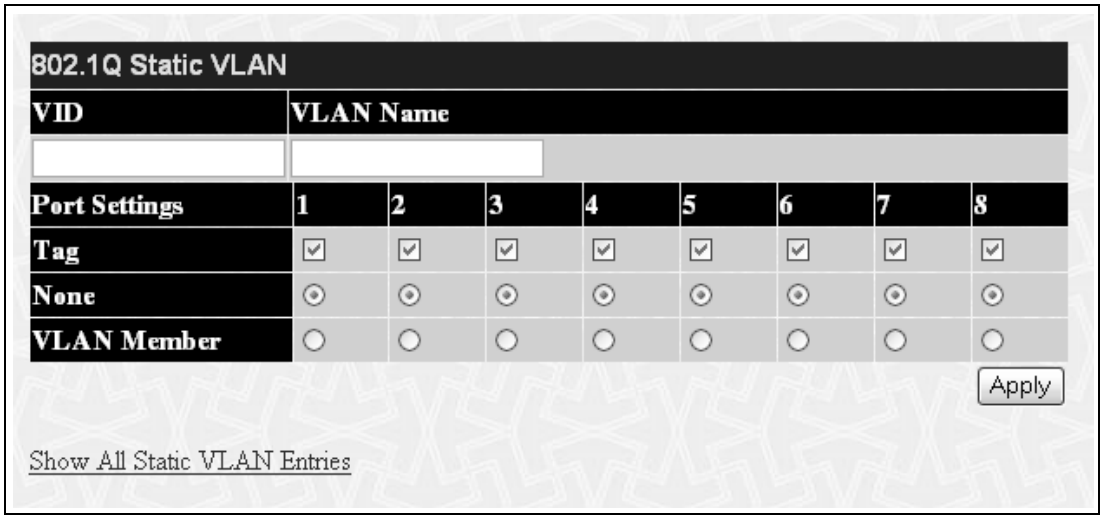


Figure 16. VLAN Detail Page

3. In the **VID** field, supply a number for the VLAN ID, from 2 to 4094.
4. In the **VLAN Name** field, enter a unique name for the VLAN. No spaces are allowed.
5. In the **Tag** row, select the ports that you want to be tagged members of the VLAN.

> **Note**
> If you want a port to be an untagged member of a different VLAN, you must first modify the VLAN (usually the default VLAN) where the port is an untagged member. First, delete that port from the original VLAN and then assign the port to another VLAN as an untagged port.

6. To select the ports you want to assign to the VLAN, do one of the following:
   - In the **None** row, click the port that you do not want to be included in the VLAN.
   - In the **VLAN Member** row, select the ports that you want to assign to the VLAN.
7. Click **Apply** to implement your changes.
8. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.
9. Click **Apply**.

Displaying all VLANs

To view all the currently configured VLANs, perform the following procedure:

1. From the main menu, select **VLAN Configuration**.

   The VLAN Configuration page is shown in Figure 15 on page 43.
2. Click **Show All Static VLAN Entries**.

The list of current VLANs is shown in Figure 17.

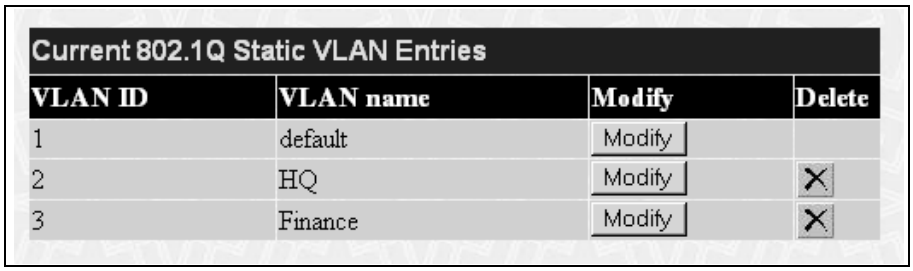


Figure 17. Current VLANs Page

Modifying a VLAN

To modify the ports in a VLAN, perform the following procedure:

1. From the main menu, select **VLAN Configuration**.

   The VLAN Configuration page is shown in Figure 15 on page 43.

2. Click **Modify** next to the VLAN you want to modify.

   The VLAN detail page for that VLAN is displayed, as shown in Figure 16 on page 43.

3. Make your changes to the VLAN.

4. Click **Apply** to implement your changes.

5. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

6. Click **Apply**.

Deleting a VLAN

To delete a VLAN, perform the following procedure:

1. From the main menu, select **VLAN Configuration**.

   The VLAN Configuration page is shown in Figure 15 on page 43.

2. Click the X in the Delete column next to the VLAN you want to delete.

   The VLAN is immediately deleted.

Protected Ports VLAN

You use the protected ports VLAN feature when you want to prevent ports from communicating with one another, but you want them all to have access to common resources. For example, in a hotel or apartment complex, the computer in each room or apartment needs to be isolated from one another, but they all need access to the internet or a server. This feature is called traffic segmentation. You set up traffic segmentation by selecting the ports connected to each room or apartment and identifying them as isolated ports, and then connecting one port to the WAN.

In Figure 18, the connection to the WAN is assigned to fiber port 8. This port is configured as the Primary (Ingress) port for the switch. Because it is the Primary port, it has full duplex capability to communicate with ports 1-7R. Ports 1-7R are configured to be isolated from one another, and therefore cannot communicate with one another.

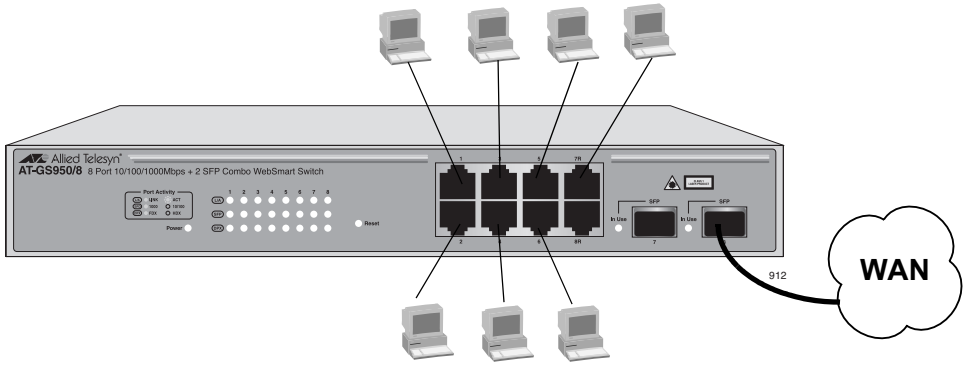


Figure 18. Protected Ports VLAN Example

Figure 19 shows what the Protected Port page for Figure 18 looks like.

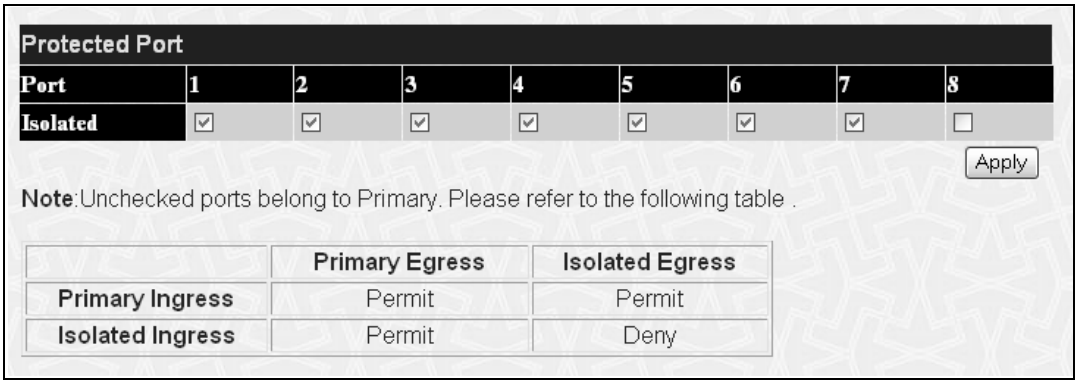


Figure 19. Protected Port Page for Figure 18

To set up a protected ports VLAN, perform the following procedure:

1. From the main menu, select **Protected Port**.

   The Protected Port page is shown in Figure 20.

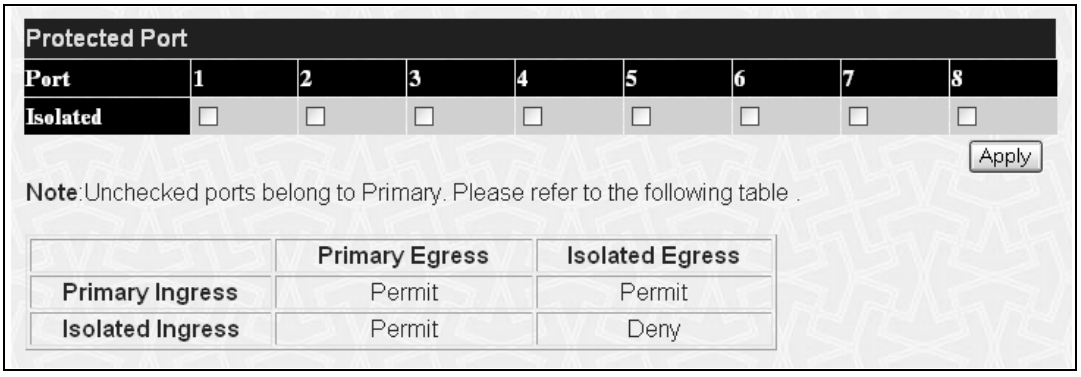


Figure 20. Protected Port Page

2. Determine which port(s) will be the Primary port(s).
3. Click the box on the Isolated row for all ports that you want to isolate from one another.

   The box for the Primary port(s) should be empty.

4. Click **Apply**.

Chapter 6

Class of Service

This chapter contains the following sections:

Class of Service Overview

When the egress queues on a port in an Ethernet switch contains more packets than the port can handle in a timely manner, the port may be forced to delay the transmission of some packets. A port may be forced to delay transmission of packets while it handles other traffic and, in some situations, some packets destined to be forwarded from the port are discarded.

Minor delays are often of no consequence to a network or its performance. But there are applications referred to as *delay-* or *time-sensitive*, that can be impacted by packet delays. Voice transmission and video conferencing are two examples. If packets containing data for either of these applications are delayed in reaching their destination, the audio or video quality may suffer.

CoS allows you to manage the flow of traffic through a switch by setting the switch ports to give higher priority to some packets, such as delay-sensitive traffic, over other packets. This is referred to as *prioritizing traffic*.

CoS applies primarily to tagged packets. A tagged packet contains information that specifies the VLAN to which the packet belongs and can also contain a priority level. Network switches and other networking devices use the priority level to determine how important that packet is compared to other packets. High priority packets are handled before low priority packets.

Mapping Ports to Egress Queues

CoS, as defined in the IEEE 802.1p standard, has eight levels of priority—0 to 7, with 0 the lowest priority and 7 the highest. Each port has four egress queues, labeled Q0, Q1, Q2, and Q3. Q0 is the lowest priority queue and Q3 is the highest. A packet in a high priority egress queue is typically transmitted out a port sooner than a packet in a low priority queue.

Table 1 lists the mappings between the eight CoS priority levels and the four egress queues of a switch port.

Table 1. Default Mappings of IEEE 802.1p Priority Levels to Priority Queues

IEEE 802.1p Priority Level	Port Priority Queue
0	Q1
1	Q0
2	Q0
3	Q1
4	Q2
5	Q2
6	Q3
7	Q3

For example, if a tagged packet with a priority level of 2 entered a port on the switch, the switch would store the packet in Q11 on the egress port.

Note that priority 0 is mapped to CoS queue 1 instead of CoS queue 0 because tagged traffic that has never been prioritized has a VLAN tag user priority of 0. If priority 0 was mapped to CoS queue 0, this default traffic goes to the lowest queue, which is probably undesirable.

Scheduling

A switch port needs a mechanism for knowing the order in which it should handle the packets in its four egress queues. For example, if all the queues contain packets, should the port transmit all packets from Q3, the highest priority queue, before moving on to the other queues? Or, should it instead just send a few packets from each queue and, if so, how many?

This control mechanism is called *scheduling*. Scheduling determines the order in which a port handles the packets in its egress queues. The AT-S82 management software uses weighted round-robin scheduling. This method functions as its name implies. The port transmits a set number of packets from each queue, in a round robin fashion, so that each queue has an opportunity to transmit traffic. This method guarantees that every queue receives some attention from the port for transmitting packets.

To set up scheduling, you need to specify the maximum number of packets a port should transmit from a queue before moving to the next queue. This is referred to as specifying the *weight* of a queue. In all likelihood, you will want to give greater weight to the packets in the higher priority queues over the lower queues. Table 2 provides a scheduling

example.

Table 2. Scheduling Example

Port Egress Queue	Maximum Number of Packets
Q0	1
Q1	5
Q2	15
Q3	25

In this example, the port transmits a maximum of 25 packets from Q3, then 15 packets from Q2, and so forth.

Mapping Priorities to Queues

To map priorities to queues, perform the following procedure:

1. From the main menu, select **CoS Priority to Queue**.

   The CoS Priority to Queue page is shown in Figure 21.

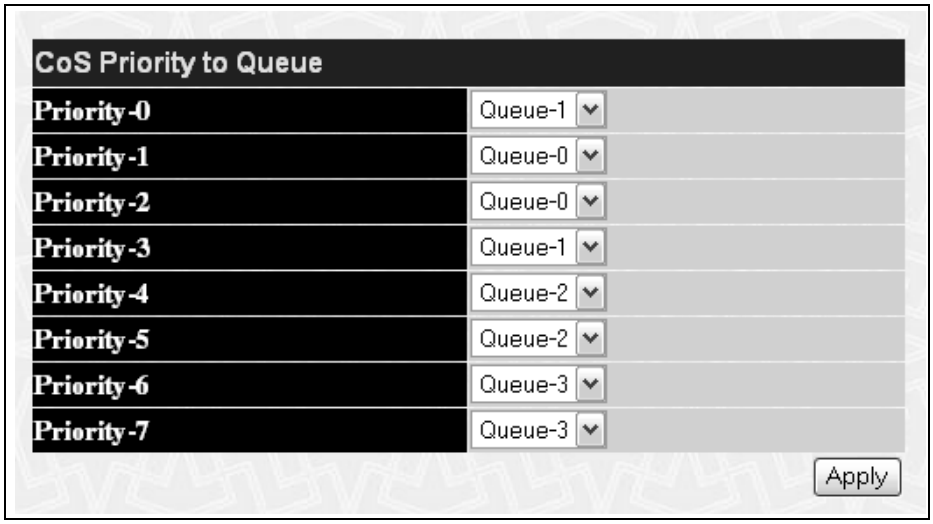


Figure 21. CoS Priority to Queue Page

   The default queue for each priority is displayed

2. To set the queue associated with a priority, select a new queue from the adjacent list.

3. Click **Apply** to implement your changes.

4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Setting Up the Schedule

To configure map ports to priority queues, perform the following procedure:

1. From the main menu, select **CoS Output Scheduling**.

   The CoS Output Scheduling page is shown in Figure 21.

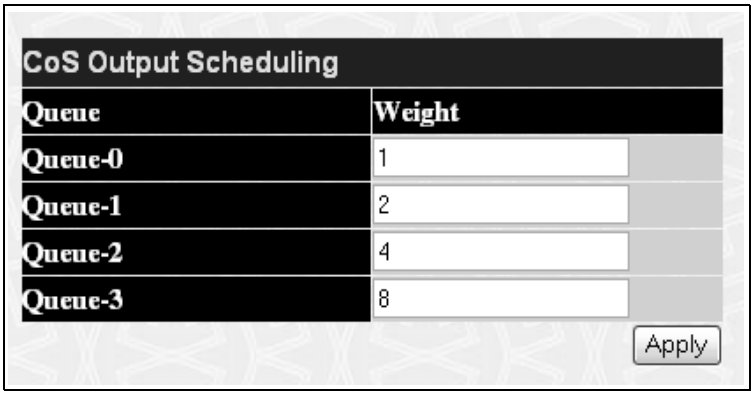


Figure 22. Output Scheduling Page

2. To set the weight for a queue, go to that queue and type a number.
3. Click **Apply** to implement your changes.
4. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

5. Click **Apply**.

Assigning Priority to Ports

To assign a priority to a specific port, perform the following procedure:

1. From the main menu, select **CoS Port Priority Assignment**.

   The CoS Port Priority Assignment page is shown in Figure 23.

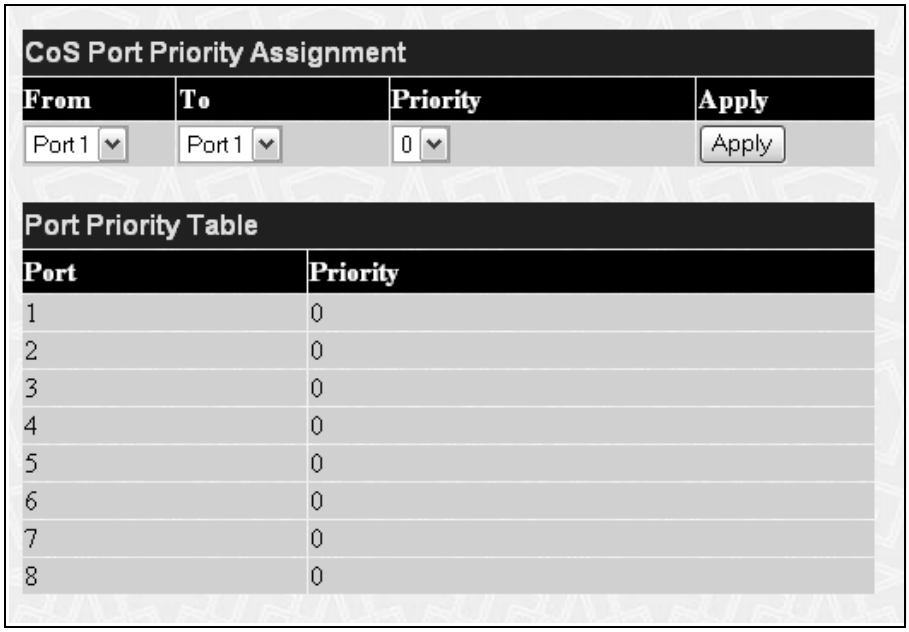


Figure 23. CoS Port Priority Assignment Page

2. Choose the port you want to set using the **From** and **To** lists. You can select one port (From 2 To 2, for example) or a range of ports (From 1 To 5, for example).

3. To set the priority of the port, choose a priority from the **Priority** list.

4. Click **Apply** to implement your changes.

5. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

   The Save Configuration page is shown in Figure 3 on page 14.

6. Click **Apply**.

Chapter 7

Spanning Tree Protocol (STP)

This chapter contains the following sections:

Spanning Tree Overview

The performance of a Ethernet network can be negatively impacted by the formation of a data loop in the network topology. A data loop exists when two or more nodes on a network can transmit data to each other over more than one data path. The problem that data loops pose is that data packets can become caught in repeating cycles, referred to as broadcast storms, that needlessly consume network bandwidth and can significantly reduce network performance.

The Spanning Tree Protocol (STP) prevents data loops from forming by ensuring that only one path exists between the end nodes in your network. Where multiple paths exist, these protocols place the extra paths in a standby or blocking mode, leaving only one main active path.

STP can also activate a redundant path if the main path goes down. So not only do these protocols guard against multiple links between segments and the risk of broadcast storms, but they can also maintain network connectivity by activating a backup redundant path in case a main link fails.

Where the two protocols differ is in the time each takes to complete the process referred to as *convergence*. When a change is made to the network topology, such as the addition of a new bridge, a spanning tree protocol must determine whether there are redundant paths that must be blocked to prevent data loops, or activated to maintain communications between the various network segments. This is the process of convergence.

With STP, convergence can take up to a minute to complete in a large network. This can result in the loss of communication between various parts of the network during the convergence process, and the subsequent lost of data packets.

The STP implementation on the AT-S82 management software complies with the IEEE 802.1d standard.

Bridge Priority and the Root Bridge

The first task that bridges perform when a spanning tree protocol is activated on a network is the selection of a *root bridge*. A root bridge distributes network topology information to the other network bridges and is used by the other bridges to determine if there are redundant paths in the network.

A root bridge is selected by the *bridge priority* number, also referred to as the bridge identifier, and sometimes the bridge's MAC address. The bridge with the lowest bridge priority number in the network is selected as the root bridge. If two or more bridges have the same bridge priority number, of those bridges the one with the lowest MAC address is designated as the root bridge.

You can change the bridge priority number in the AT-S82 management software. You can designate which switch on your network you want as the root bridge by giving it the lowest bridge priority number. You might also consider which bridge should function as the backup root bridge in the event you need to take the primary root bridge offline, and assign that bridge the second lowest bridge identifier number.

The bridge priority has a range 0 to 61440 in increments of 4096. To make this easier for you, the AT-S82 management software divides the range into increments. The valid range is of sixteen increments is shown in Table 3.

Table 3. Bridge Priority Value Increments

Increment	Bridge Priority	Increment	Bridge Priority
0	0	8	32768
1	4096	9	36864
2	8192	10	40960
3	12288	11	45056
4	16384	12	49152
5	20480	13	53248
6	24576	14	57344
7	28672	15	61440

Path Costs and Port Costs

After the root bridge has been selected, the bridges must determine if the network contains redundant paths and, if one is found, they must select a preferred path while placing the redundant paths in a backup or blocking state.

Where there is only one path between a bridge and the root bridge, the bridge is referred to as the *designated bridge* and the port through which the bridge is communicating with the root bridge is referred to as the *root port*.

If redundant paths exist, the bridges that are a part of the paths must determine which path will be the primary, active path, and which path(s) will be placed in the standby, blocking mode. This is accomplished by an determination of *path costs*. The path offering the lowest cost to the root bridge becomes the primary path and all other redundant paths are placed into blocking state.

Path cost is determined through an evaluation of *port costs*. Every port on

a bridge participating in STP has a cost associated with it. The cost of a port on a bridge is typically based on port speed. The faster the port, the lower the port cost. The exception to this is the ports on the root bridge, where all ports have a port cost of 0.

Path cost is simply the sum of the port costs between a bridge and the root bridge.

The AT-GS950/8 WebSmart switch automatically sets the port cost according to the speed of the port, assigning a lower value for higher speeds. Table 6 lists the STP port costs.

Table 4. STP Port Costs

Port Speed	Port Cost
10 Mbps	100
100 Mbps	10
1000 Mbps	4

Table 5 lists the STP port costs with Auto when a port is part of a port trunk.

Table 5. STP Auto-Detect Port Trunk Costs

Port Speed	Port Cost
10 Mbps	4
100 Mbps	4
1000 Mbps	2

Table 6 lists the RSTP port costs with Auto.

Table 6. RSTP Auto Port Costs

Port Speed	Port Cost
10 Mbps	2,000,000
100 Mbps	200,000
1000 Mbps	20,000

Table 7 lists the RSTP port costs with Auto when the port is part of a port

trunk.

Table 7. RSTP Auto Port Trunk Costs

Port Speed	Port Cost
10 Mbps	20,000
100 Mbps	20,000
1000 Mbps	2,000

You cannot set the port cost manually.

Port Priority

If two paths have the same port cost, the bridges must select a preferred path. In some instances this can involve the use of the *port priority* parameter. This parameter is used as a tie breaker when two paths have the same cost.

The range for port priority is 0 to 240. As with bridge priority, this range is broken into increments, in this case multiples of 16. Table 8 lists the valid port priority values. The default value is 128, which is increment 8.

Table 8. Port Priority Value Increments

Increment	Port Priority	Increment	Port Priority
0	0	8	128
1	16	9	144
2	32	10	160
3	48	11	176
4	64	12	192
5	80	13	208
6	96	14	224
7	112	15	240

Forwarding Delay and Topology Changes

If there is a change in the network topology due to a failure, removal, or addition of any active components, the active topology also changes. This may trigger a change in the state of some blocked ports. However, a change in a port state is not activated immediately.

It might take time for the root bridge to notify all bridges that a topology

change has occurred, especially if it is a large network. If a topology change is made before all bridges have been notified, a temporary data loop could occur, and that could adversely impact network performance.

To forestall the formation of temporary data loops during topology changes, a port designated to change from blocking to forwarding passes through two additional states—listening and learning—before it begins to forward frames. The amount of time a port spends in these states is set by the forwarding *delay* value. This value states the amount of time that a port spends in the listening and learning states prior to changing to the forwarding state.

The forwarding delay value is adjustable in the AT-S82 management software. The appropriate value for this parameter depends on a number of variables; the size of your network is a primary factor. For large networks, you should specify a value large enough to allow the root bridge sufficient time to propagate a topology change throughout the entire network. For small networks, you should not specify a value so large that a topology change is unnecessarily delayed, which could result in the delay or loss of some data packets.

Note
The forwarding delay parameter applies only to ports on the switch that are operating STP-compatible mode.

Hello Time and Bridge Protocol Data Units (BPDUs)

The bridges that are part of a spanning tree domain communicate with each other using a bridge broadcast frame that contains a special section devoted to carrying STP or RSTP information. This portion of the frame is referred to as the bridge protocol data unit (BPDU). When a bridge is brought online, it issues a BPDU in order to determine whether a root bridge has already been selected on the network, and if not, whether it has the lowest bridge priority number of all the bridges and should therefore become the root bridge.

The root bridge periodically transmits a BPDU to determine whether there have been any changes to the network topology and to inform other bridges of topology changes. The frequency with which the root bridge sends out a BPDU is called the *hello time*. This is a value that you can set in the AT-S82 management software. The interval is measured in seconds and the default is two seconds. Consequently, if an AT-GS950/8 WebSmart switch is selected as the root bridge of a spanning tree domain, it transmits a BPDU every two seconds.

Point-to-Point and Edge Ports

Note
This section applies only to RSTP.

Part of the task of configuring RSTP is defining the port types on the bridge. This relates to the device(s) connected to the port. With the port types defined, RSTP can reconfigure a network much quicker than STP when a change in network topology is detected.

There are two possible selections:

- Point-to-point port
- Edge port

If a bridge port is operating in full-duplex mode, than the port is functioning as a point-to-point port. Figure 24 illustrates two AT-GS950/8 WebSmart switches that have been connected with one data link. With the link operating in full-duplex, the ports are point-to-point ports.

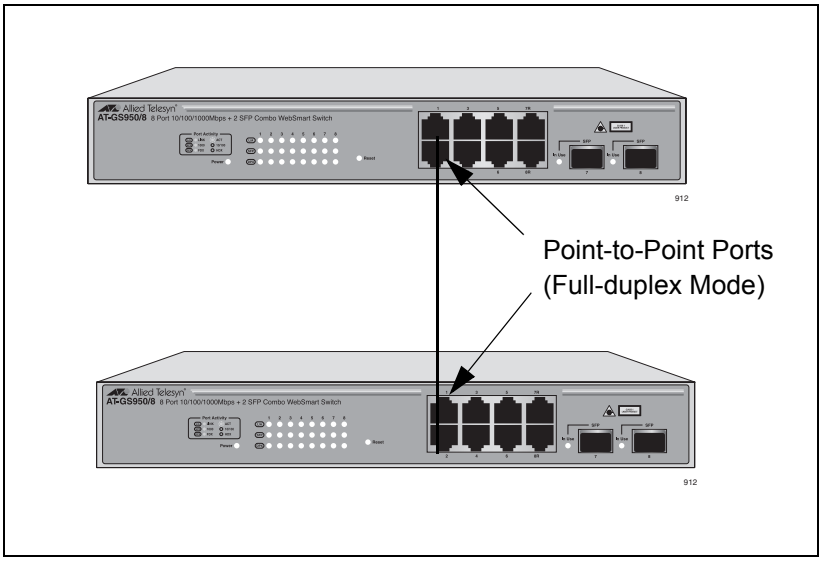


Figure 24. Point-to-Point Ports

If a port is operating in half-duplex mode and is not connected to any further bridges participating in STP or RSTP, then the port is an edge port. Figure 25 illustrates an edge port on an AT-GS950/8 WebSmart switch. The port is connected to an Ethernet hub, which in turn is connected to a series of Ethernet workstations. This is an edge port because it is connected to a device operating at half-duplex mode and there are no participating STP or RSTP devices connected to it.

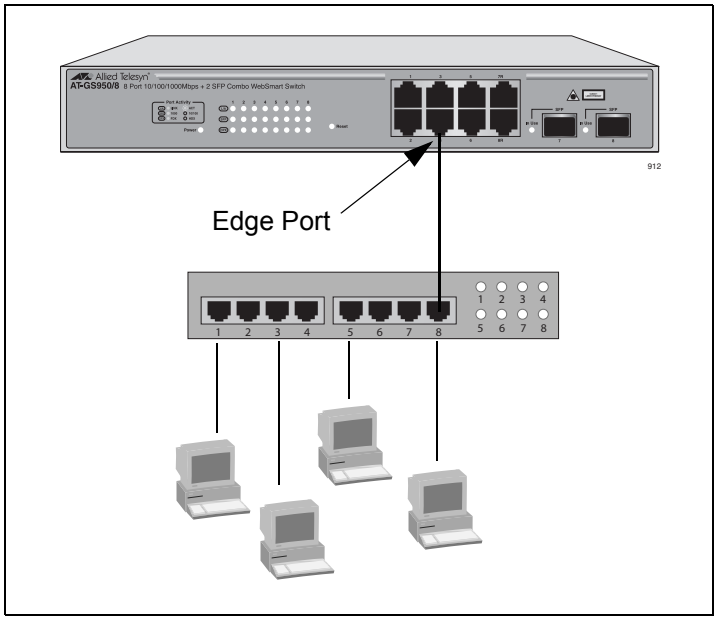


Figure 25. Edge Port

A port can be both a point-to-point and an edge port at the same time. It operates in full-duplex and has no STP or RSTP devices connected to it. Figure 26 illustrates a port functioning as both a point-to-point and edge port.

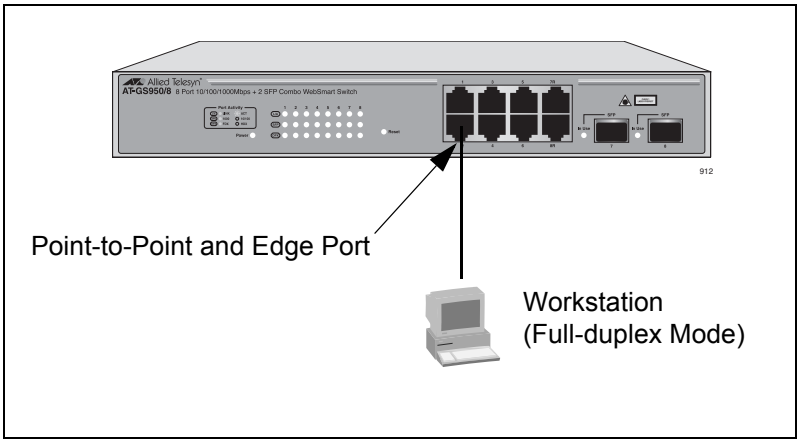


Figure 26. Point-to-Point and Edge Port

Determining whether a bridge port is point-to-point, edge, or both, can be a bit confusing. For that reason, do not change the default values for this RSTP feature unless you have a good grasp of the concept. In most cases, the default values work well.

RSTP IEEE 802.1w is fully compliant with STP IEEE 802.1d. Your network can consist of bridges running both protocols. STP and RSTP in the same network can operate together to create a single spanning tree domain.

If you decide to activate spanning tree on the switch, there is no reason not to activate RSTP on an AT-GS950/8 WebSmart switch even when all other switches are running STP. The switch can combine its RSTP with the STP of the other switches. The switch monitors the traffic on each port for BPDU packets. Ports that receive RSTP BPDU packets operates in RSTP mode while ports receiving STP BPDU packets operate in STP mode.

Spanning Tree and VLANs

The spanning tree implementation in the AT-S82 management software is a single-instance spanning tree. The switch supports just one spanning tree. You cannot define multiple spanning trees.

The single spanning tree encompasses all ports on the switch. If the ports are divided into different VLANs, the spanning tree crosses the VLAN boundaries. This point can pose a problem in networks containing multiple VLANs that span different switches and are connected with untagged ports. In this situation, STP blocks a data link because it detects a data loop. This can cause fragmentation of your VLANs.

This issue is illustrated in Figure 27. Two VLANs, Sales and Production, span two AT-GS950/8 WebSmart switches. Two links consisting of untagged ports connect the separate parts of each VLAN. If STP or RSTP is activated on the switches, one of the links is disabled. In the example, the port on the top switch that links the two parts of the Production VLAN is changed to the block state. This leaves the two parts of the Production VLAN unable to communicate with each other.

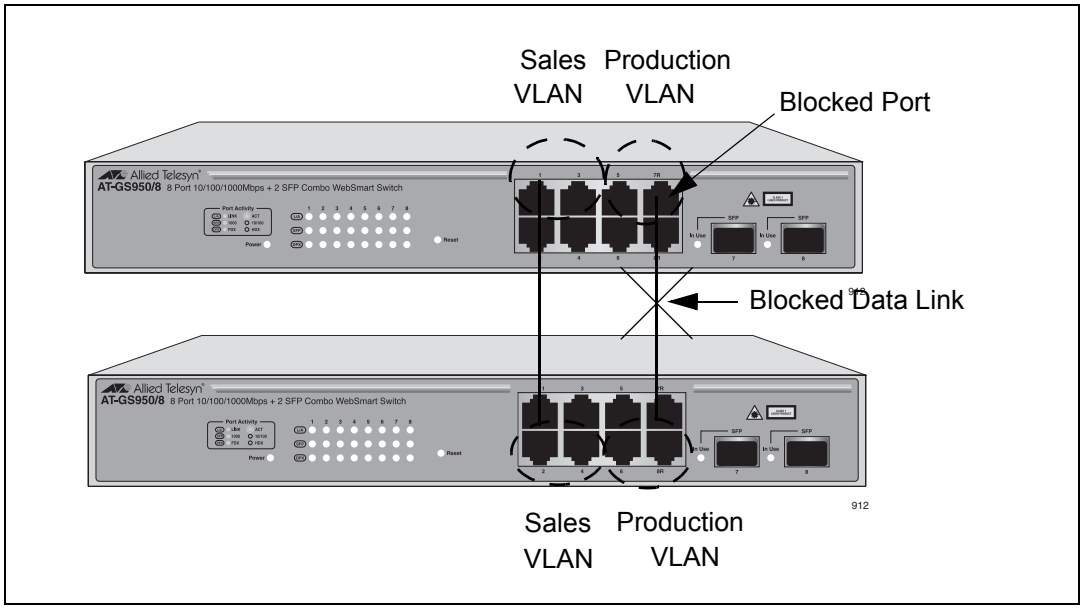


Figure 27. VLAN Fragmentation

You can avoid this problem by not activating spanning tree or by connecting VLANs using tagged instead of untagged ports. (For

information on tagged and untagged ports, refer to Chapter 5, “VLANs” on page 37.)

Configuring Spanning Tree

To define the spanning tree settings at the switch level, perform the following procedure:

1. From the main menu, select **STP Global Settings**.

   The Switch Spanning Tree Settings page is shown in Figure 28.

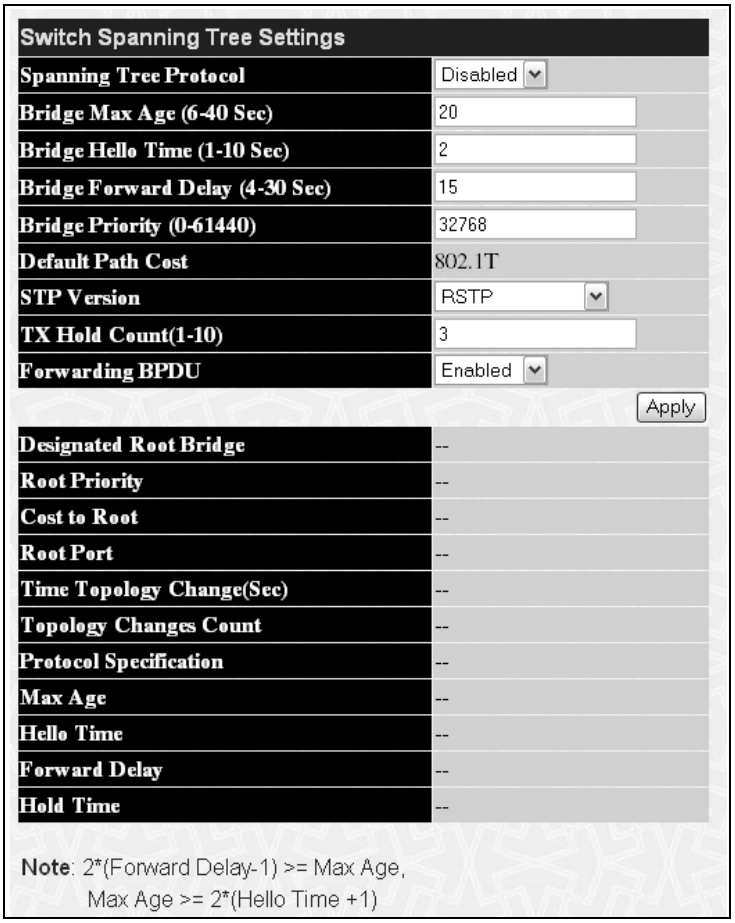


Figure 28. Switch Spanning Tree Settings Page

2. From the **STP Version** list, select **STP** or **RSTP**.

3. In the **Bridge Max Age** field, enter a number for the length of time after which stored bridge protocol data units (BPDUs) are deleted by the bridge. All bridges in a bridged LAN use this aging time to test the age of stored configuration messages called bridge protocol data units (BPDUs). For example, if you use the default value 20, all bridges delete current configuration messages after 20 seconds. This parameter can be from 6 to 40 seconds.

When you select a value for maximum age, observe the following rules:

MaxAge must be greater than (2 x (HelloTime + 1)).

MaxAge must be less than (2 x (ForwardingDelay - 1)).

Note
The aging time for BPDUs is different from the aging time used by the MAC address table.

4. In the **Bridge Hello Time** field, enter a number for the time interval between generating and sending configuration messages by the bridge. This parameter can be from 1 to 10 seconds. The default is 2 seconds.

5. In the **Bridge Forward Delay** field, enter a number for the waiting period in seconds before a bridge changes to a new state, for example, becomes the new root bridge after the topology changes. If the bridge transitions too soon, not all links may have yet adapted to the change, resulting in network loops. The range is 4 to 30 seconds. The default is 15 seconds.

6. In the **Bridge Priority** field, enter a number for the priority number for the bridge. This number is used to determine the root bridge for RSTP. The bridge with the lowest priority number is selected as the root bridge. If two or more bridges have the same priority value, the bridge with the numerically lowest MAC address becomes the root bridge. When a root bridge goes offline, the bridge with the next priority number automatically takes over as the root bridge. This parameter can be from 0 (zero) to 61,440 in increments of 4096, with 0 being the highest priority. For a list of the increments, refer to Table 3, “Bridge Priority Value Increments” on page 59.

7. From the **STP Version** list, select one of the following:

   RSTP
   Enables the Remote Spanning Tree Protocol.

   STP Compatible
   Enables the Spanning Tree Protocol.

8. In the **TX Hold Count** field, enter a number from 1 to 10 to specify the maximum number of BPDU packets in each hello time.

9. From the **Forwarding BPDU** list, select one of the following:

   Enabled
   The AT-GS950/8 WebSmart switch does not process the BPDU

packets but forwards them to adjacent switches. This is the default setting.

Disabled
The switch processes the BPDU packets. Allied Telesis recommends that you choose this setting.

10. Click **Apply**.

    To configure the ports, refer to "Configuring STP Port Settings," next.

11. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

    The Save Configuration page is shown in Figure 3 on page 14.

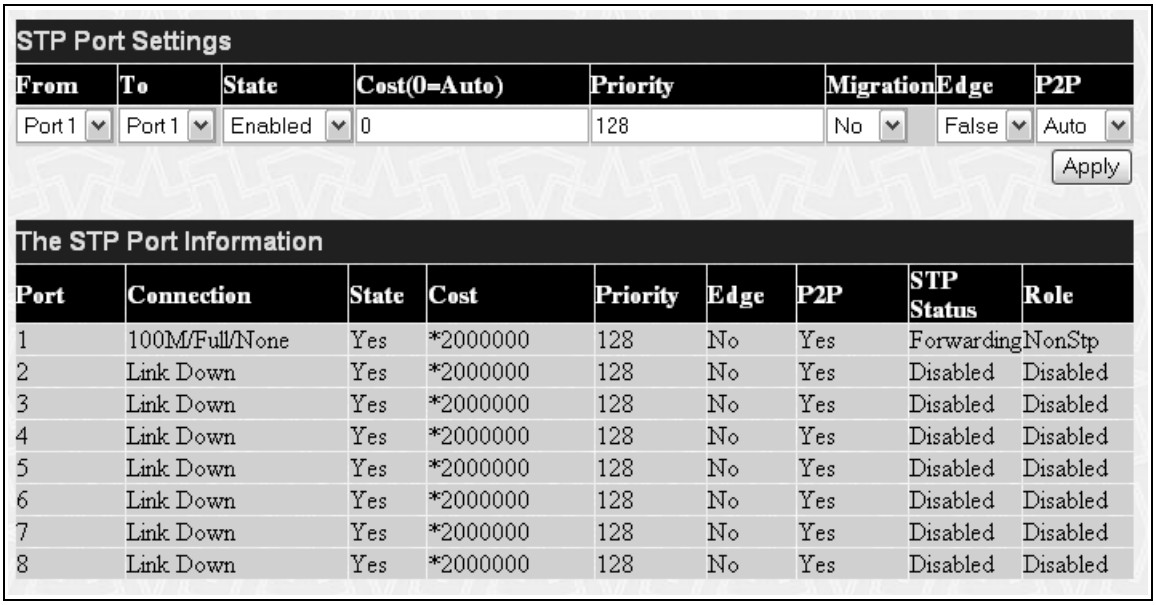
12. Click **Apply**.

Configuring STP Port Settings

To configure the STP settings, perform the following procedure:

1. From the main menu, select **STP Port Settings**.

   The STP Port Settings page is shown in Figure 29.



STP Port Settings

From	To	State	Cost(0=Auto)	Priority	Migration	Edge	P2P
Port 1	Port 1	Enabled	0	128	No	False	Auto

Apply

The STP Port Information

Port	Connection	State	Cost	Priority	Edge	P2P	STP Status	Role
1	100M/Full/None	Yes	*2000000	128	No	Yes	Forwarding	NonStp
2	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
3	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
4	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
5	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
6	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
7	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled
8	Link Down	Yes	*2000000	128	No	Yes	Disabled	Disabled

Figure 29. STP Port Settings Page

2. From the **From** and **To** lists, select the port(s) you want to configure, or scroll through the list below.

3. From the **State** list, select one of the following:

   Enabled
   Enables the port for spanning tree. This is the default.

   Disabled
   Disables spanning tree on the port.

4. In the **Cost** box, type a number for the cost or type **0** for Auto (automatic).

   The spanning tree algorithm uses the cost parameter to decide which port provides the lowest cost path to the root bridge for that LAN. The range is 0 to 65,535. The default setting is Auto, which sets port cost depending on the speed of the port. The Auto default values are shown in Table 4 on page 60 andTable 5 on page 60.

5. In the **Priority** box, type a number for the port's priority.

This parameter is used as a tie breaker when two or more ports are determined to have equal costs to the root bridge. The range is 0 to 240 in increments of 16. The default value is 8 (priority value 128). For a list of the increments, refer to Table 8, "Port Priority Value Increments" on page 61.

6. From the **Migration** list, select one of the following:

   No
   Disallows resetting an RSTP port to handle STP BPDUs. This is the default setting.

   Yes
   Resets an RSTP port, allowing it to send RSTP BPDUs. When an RSTP bridge receives STP BPDUs on an RSTP port, the port transmits STP BPDUs. The RSTP port continues to transmit STP BPDUs indefinitely

7. From the **Edge** list, select one of the following:

   False
   The port does not function as an edge port.

   True
   Makes the port an edge port.

   Note
   A port can be both a point-to-point and an edge port at the same time

8. In the **P2P** list, select one of the following:

   Auto
   The switch automatically detects if the port is functioning as a point-to-point port.

   False
   Sets the port to never function as a point-to-point port.

   True
   Sets the port to always function as a point-to-point port.

9. Click **Apply**.

10. To save the settings to the configuration file, from the main menu, select **Save Configuration**.

    The Save Configuration page is shown in Figure 3 on page 14.

11. Click **Apply**.